PROGRAM ACTIVITY REPORT (PAR)

BORNA VIRUS IN MUTE SWANS

Borna virus causes neurological disease that has been found in a number of domestic and wild mammals. The virus is a non-segmented, negative strand RNA virus (Family Bornaviridae) that can cause fatal movement and behavioral disorders in birds and mammals. Although Borna virus has also been found in human brain tissues, its role as a disease agent in humans is disputed by the medical community.

In 1998 several genotypes of Borna virus were identified and associated with psittascine birds (i.e., parrots, macaws, conures). These avian Borna viruses are thought to be a cause of proventricular dilatation disease in birds, which is characterized by damage to the nerves of the enteric system; food accumulates in the paralyzed proventriculus, eventually leading to death.

The NWDP continues to collaborate with Texas A&M University on Borna viruses in wildlife. Using swab samples from the NWDP Wild Bird Tissue Archive, researchers at Texas A&M recently demonstrated that avian Borna virus is common in Canada geese (*Branta canadensis*) sampled in North America. The virus was subsequently isolated in brain tissues of other Canada geese. Interestingly, after genetic sequencing, the virus from geese clustered closer to mammalian Borna virus than to the avian form that afflicts psittascines. Since then, the search for Borna virus in wild birds has been extended to snow geese (*Chen caerulescens*), swans, and gulls.

As part of a larger study on mute swan (*Cygnus olor*) diseases, wildlife disease biologists in Michigan, New York, New Jersey, Massachusetts, Rhode Island, and New Hampshire opportunistically collected samples in association with population management activities. Samples are being screened by RT-PCR at Texas A&M. Borna virus positives are cultured and all recovered isolates are genetically sequenced. Borna virus has been found in as many as 50% of mute swan samples collected from some areas, suggesting that the virus is commonly found in this species.

The significance of Borna virus in wild bird populations is unclear. While the majority of positive samples have come from apparently healthy animals, there are a few reports of geese and swans exhibiting clinical signs of neurologic disease that were also determined to be infected with Borna virus. However, a causal link was not established in these cases and there is no evidence that wild birds contribute to the spread of the virus. The ongoing collaboration with Texas A&M should help elucidate the epidemiology of Borna virus in wildlife.

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The original artwork on this page was created by the National Wildlife Disease Program's Erika Kampe and Sarah Goff